BIO-DYNAMICS

A periodical furthering soil conservation and increased fertility in order to improve nutrition and health.

SPRING 1950

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CORRECTION

The table on Page 7 in the Winter 1949 Number of Bio-Dynamics, near the conclusion of Dr. Pfeiffer's *Observations on Bio-Dynamic and Mineral Treatment of Soil,* should be corrected to read:

Carotene Content in Gammas Per Gram of Green Leaves

	Min.	*B.D.*
Tomato	35.10	47.25
Bean	13.50	56.25
Beet	5.4	18.9
Corn	54.0	91.25

The above table represents correctly the results of the tests made in the Biochemical Research Laboratory. Through a printer's error, which was overlooked by the editors, the captions over the columns of figures had been reversed, indicating a contrary result.

Readers may also wish to correct the cover page designation of the Winter 1949 Number to read: VOL. VIII No. 1. *The Editors*

MUNICIPAL AND INDUSTRIAL COMPOSTING

EHRENFRIED PFEIFFER

The trend in modern agriculture toward monocultures, industrial crops, reducing labor and cutting down livestock is not to the benefit of the soil. The organic matter in soil, and with it humus, nitrogen, and colloidal structure, has been steadily declining. The organic matter content of arable, tilled fields in the U. S. has dropped to 1.5%, while virgin land and black fertile soils still contain 4 to 5%. Ten years have passed since it was stated that the average nitrogen content of fields had declined 30 to 40% as against their content 50 years ago. It is a well-known fact that the fertilizer industry is unable to provide all the nitrogen the farmers need. Indeed, it can supply only a very small fraction of these needs. The farmer is thus forced to look for natural resources. As long as he returns manure and compost to the land, uses soil conserving crop rotations, and plants cover and green manuring crops he is able to hold his soil.

But many areas are planted in monocultures of fruit trees, vegetables (truck gardens), cotton, sugar cane, and sugar beets, which do not produce manure or compost and so create a dangerous deficiency in humus. At the opposite pole we have the example of the organic farmers and gardeners, who make use of every possible supply of organic matter and turn it into humus. The writer's laboratory has been analyzing soils for several years and the evidence of humus increase in organically treated soils is mounting.

When looking about in search of further sources of organic matter, particularly for areas of monocultures with little or no livestock (manure), municipal and industrial wastes are bound to attract one's attention. Let's step right into the middle of the problem and illustrate its importance. A

medium sized town with a population of 50,000, produces between 100 and 200 tons of waste garbage daily. We are speaking here only of household, restaurant, fruit and vegetable market garbage and kitchen waste which can be turned into compost. In addition, there are of course sewage sludge, industrial wastes, etc. This daily production of 100 tons turned into compost will add up to about 35,000 tons per year. At the rate of 5 tons of compost per acre (which is equivalent to 10 tons of farmyard manure in fertilizing value) 7,000 acres of land could receive all the fertilizer they need from the garbage of such a town. Greater New York, it is estimated, produces about 1½ lbs. of compostable household garbage per capita every day. This would be enough to fertilize 230,000 acres of land every year.

Nowadays, municipalities erect expensive incinerators to get rid of their garbage. The resulting cinders have no soil-humus building value.

The biological problem of large garbage composting plants has been solved. The question now is whether such processes can be used to advantage in economically feasible projects. The answer of this writer is yes —on the basis of experience and figures. Bacteriological processes have been worked out by means of which special, concentrated cultures can be produced. These, in turn are injected into garbage piles and speed up the fermentation toward humus. One condition, and this is fundamental, is that the garbage be ground up mechanically as fine as possible. The bacteria culture can be added while this grinding is going on.

There are several processes in existence at present, all of which aim at the same goal. The Earp Thomas process uses a certain type of culture mixture and a digester. Then there is the procedure which was followed in the experimental plant at York, Pa., known as the Frazer-Eweson process.

This writer's research was governed by the thought that garbage composting should be simplified so as to allow a product which could be offered for $35 per ton, or even less, in order to make it attractive to the farmer and truck gardener.

Methods of grinding were investigated in a pilot plant. Heavy, high speed cutting machines like the Mitts & Merrill Red Band Hog, Model A, deliver a finely chopped material which is just right for the bacteria which break down and digest crude organic matter. It is possible to direct this process so that no bad odors occur. Consequently, storage tanks and digesters are not needed, and the material can be put out in open piles. In cases where there is cheap land available batteries of such piles can be set up.

Here is the outline of a simplified, economic, garbage composting project worked out by the author. This plant would consist of a receiving platform with chutes, similar to the equipment of a stone crushing plant. Dump trucks would unload the garbage, etc. into these chutes which all lead into the central feed hopper of the grinding machine. The down-feed into the grinder would be regulated in such a way that an even mixture of all ingredients plus the compost starter culture is obtained.

The Mitts & Merrill Red Band Hog A, mentioned above, grinds up to 2 tons of material per hour with properly controlled feeding. There are

other hogs for larger quantities which will handle up to 10 tons per hour. We have tried the Red Band Hog and found that it does a very satisfactory job, while some other so-called compost grinders (of the hammer mill type) clog up when fed very wet, juicy material or are soon stopped by dry weeds and straw winding around their axles. The Red Band Hog works without a screen and discharges the material in an even flow, or blast, up to a distance of 30 feet. The discharged material can be collected directly by a conveyor system and transported to the site of a battery of piles for fermentation. These piles, because of the bacteria starter used and the fine distribution of the material (which is aerated while being blasted on the belt) do not need to be turned or worked over. The only requirement is that they be kept from drying out, protected from direct sunlight. In a warm, dry southern climate pits or trenches might be necessary.

The fermentation takes place in 4 to 21 days within the outside temperature limits of 45 to 90 degrees F. A compost plant, therefore, will need some land for storage space, so that the piles can be held for at least one month to be on the safe side. Since compost is not usually sold all year round, but mainly when needed by the farmer or gardener, in spring and fall, a larger storage space may be needed. We figure that about 6 acres would be enough for a plant with a production of 100 tons per day. Besides, once the material has rotted it might be scraped together with a mechanical loader and larger piles for storage built up.

This system has the advantage that no expensive storage or digesting tanks are needed. The finished material can be picked up right from the piles with a rotary type ditch digger with buckets. This machine is hooked up to a tractor and can be driven right into the pile or pit. It has a discharge conveyor which can be connected with a bagging machine or can load a truck or railroad car directly.

We have loaded such compost on a truck with a trailing, rotary type lime spreader attached, and have succeeded in spreading it at the rate of 5 tons per acre in a half hour. For local service, this method with delivery to the farm land directly is most practical. In principle, it works like the lime spreading service which is delivered to the land.

There are many sources of raw material which are suitable for such a plant. Vegetable and kitchen refuse, restaurant, fruit, meat, and fish market wastes break down quickly. In laboratory experiments and in our pilot plant, we have succeeded in decomposing such materials in 10 days time. Fibrous materials containing much cellulose, such as sawdust, wood shavings, and bagasse, take a little longer. Wool residues from wool washing and processing, tobacco dust, chrysanthemum trash, leaf mold, slaughter-house refuse, etc., are welcome admixtures. Industrial dusts and wastes, if not contaminated with antibiotic chemicals, can also be used, even soot. Sewage sludge can be added to the mixture too, but at present we advise its use only in composts for orchards, lawns, and golf courses, not for vegetable gardens where crops, such as carrots, lettuce, etc., are used for raw food.

The outlay required for this type of plant is a reasonable one. The mechanical equipment for a production of 20 tons per day may cost between ten and twelve thousand dollars, including a 33 HP gasoline power unit. The machinery needed for a plant with a daily production of 100 tons may cost between thirty and thirty-five thousand—considerably less than an incinerator! Incinerators are expensive propositions and do not produce values, while with this method of garbage disposal we have the compost to cover all the expenses, investment and operating costs as well. The figures just presented are only estimates and will undoubtedly vary according to the locality and the job to be done. Under certain conditions it is possible that expenses may be lower.

The method of garbage collection followed in a particular community is a factor which has to be taken into consideration. Some cities have ideal collecting procedures. The system used in Allentown, Pa., for instance is an excellent one. There, all garbage is collected in bags which are placed on the curb by the householder, market, etc., and picked up from there by trucks. If the grinder described above is used, these bags can be dumped right into the machine. Other towns collect organic material separate from broken glass, metal, ashes, etc., that is, dead material. Such truck loads of organic material can also be dumped right into the grinder chute. Reading, Pa. has an interesting disposal plant where all garbage is first cooked, then separated from tin and dead material after being crushed. The remaining pulp is dried and can very well be composted, too. Problems arise when everything, both dead and organic, is collected altogether. Here a sorting machine with a magnet will probably be necessary, despite the fact that we have seen the Red Band Hog does not mind an occasional tin can or glass. Glass and stoneware might be crushed to bits in a suitable machine; nails, tin, and ironware should be removed with a magnet.

The question has been raised as to whether such processes will work in northern winters. If the garbage is ground up immediately frost does not interfere much. If the piles freeze up, they will simply have to stand longer. However, the fermentation produces a certain amount of heat and the piles usually freeze only to a depth of one foot. After thawing up they will rot much faster, so probably just enough extra storage space to bridge over the freezing period will be needed. The winter conditions of the South and the Middle Zone are ideal.

Now a word about the compost itself. Very few people realize, at present, that there are two different types of compost. These correspond to the different types of fermentation. The first kind of compost (corresponding to the first stage of fermentation) is simply broken-down organic matter. The original structure of the garbage has disappeared. This break-down is effected by bacteria which develop ammonia, denitrify, digest carbohydrates and proteins, and to a small extent lignin and cellulose. These composts are low in nitrogen in general, in nitrates in particular. Many of the commercial products in existence belong to this type. In fact, the fermentation is not complete, and will go on if the stuff gets wet, is plowed under, or heats up

for one reason or another. Usually this type loses nitrogen. It is the unstable phase of compost, but if plowed under at once it will increase bacteria action in the soil. The second type and phase is the stable form when humus-forming bacteria have taken over the process and produce humus. This second kind of compost is the only one which merits the name "humus."

This writer is in favor of the second type, since nitrate forming and nitrogen fixing bacteria have taken over and the nitrogen content is therefore increased. The process described in this article produces the second type of compost. Azotobacter, one of the most important nitrogen fixing bacteria, works here. These bacteria grow slowly, under aerated conditions, hence the necessity of keeping the piles for 10 days at least. A hot fermentation with thermophile bacteria breaks organic matter down quickly but it does not increase the nitrogen content, nor does it favor the formation of humus. Our survey of all types of compost, including the majority of commercial products, reveals that they are frequently low in potassium and available phosphates as well. Sewage sludge, for instance, is very low in potassium. Hence the desire to enrich such composts and sludge by adding the minerals which are lacking. These additions can be made during the grinding process. Lime can be added too if it is a question of extreme acidity with which we have to deal. (Many of the anaerobic bacteria produce acid, as do the primary break-down bacteria.) Other, particularly aerobic, composts are slightly to moderately alkaline.

In view of all these things, continuous laboratory supervision is recommended for large composting plants so that the product can be analyzed and its formula established. Control of the fermentation process is also essential. Bacteria mixtures degenerate under certain conditions, change through the elimination of one important group and the excessive growth of another. Then the process will not be as successful as was expected. A bacteriological survey will reveal the cause and suggest the remedy. The plant manager need not be a Ph.D., but he should know enough about composting and fermentation so that he can safeguard the process. Otherwise, people will be apt to blame failure on the whole idea rather than on the lack of knowledge of the man in question.

To sum up, machine composts can be made from city garbage and industrial wastes at a reasonable cost level. They will add a welcome and important source of humus which will benefit the land. The process of fermentation has been worked out in laboratory experiments and pilot plants and it has been shown that it works. If all the organic wastes of households, restaurants, fruit, vegetable, meat and fish markets in the entire United States could be saved and turned into compost at least 30 Million Tons of compost could be made available every year, enough to maintain the fertility of 6 Million Acres of land. In addition, there are industrial wastes the amount of which is not known to the writer. Today we are still far from this goal. Yet the future of the land and of soil conservation will depend upon whether we reach it or continue to waste.

HYBRID CORN VS. OPEN POLLINATED CORN

ERNEST M. HALBLEIB

The author, whose home is at McNabb, Illinois, is a member of the Natural Science Committee of the United Farmers of America, Inc. In sending us his story, he comments:

"According to our promise, we are enclosing an article which gives an account of our experiences and of our conclusions concerning Hybrid vs. Open Pollinated corn. The Middle Western farmer is showing great concern over the standing quality of Hybrid corn and also its great moisture content. When Hybrids were first introduced, they were favorites on account of good standing stalks and even, low position of ears on short stalks, with good yields. But now, fifteen or twenty years later, these favorite characteristics have gone glimmering *and so has the protein and in many cases also the mineral content. Hybrid sweet corn is no longer sweet, while Hybrid silage has become 'woody'."*

* * *

Since the days of Liebig's discovery more than 100 years ago, there have been many attempts to get larger yields from almost all crops, including corn. The development of the Hybrid varieties is the latest attempt to increase yields of corn. All attempts have been accompanied by a loss in quality. And in every instance, increases in yields have been at the expense of the soil. The "increase in fertility of the soil," as shown by yields, has in recent years been in too many cases measured by the yield of Hybrids.

At Halbleib Orchards farm, we have tried both—the Open or natural pollinated varieties, and many Hybrid varieties. At present, we are using only the Krug Open Pollinated, because of its better quality, it having never been de-tasseled. The selection of this seed has been along the lines of type of ear and ripeness, with only those ears taken which are in seed condition at harvest time without artificial drying of any green ears.

A warning by the Chicago Museum of Natural History has revealed that Hybrid growers were on dangerous ground as to their foundation breeding stock, and that old stable varieties, to which Hybrids owe their existence as well as their continuation, were going toward extinction. The history of most Hybrids would probably reveal that the different crosses were too far already from the original to which they owe their beginning.

Here at our farm, in 1948, careful tests showed the Open Pollinated to contain more protein, more minerals and less moisture and a correspondingly better seed condition. Spectrographic tests of several Hybrids showed that none of those tested contained cobalt, while some soils under them had cobalt. These same tests showed the Hybrid varieties to contain only 13 to 16 minerals out of some 30, while the Open Pollinated Krug had 22, including cobalt.

Our tests in 1949, where Hybrids were grown on 11 different farms, in the same field with Open Pollinated, showed again—in 8 cases out of 11—that the Open Pollinated had more protein. The mineral test varied more according to the soil. The Open Pollinated did better on soils which had

no fertilizer of any kind applied and did equally as well in all the plots. The yield was equal to the Hybrids or greater. The highest Open Pollinated yield was 80 bu. per acre, while the Hybrids' best was around 70. Standing quality of the Krug was even better than the Hybrids in most cases, and it was characterized by larger and better-filled ears that were also in better seed condition. In 1948 it was 6½% drier than the Hybrids. Corn borer infestation was even greater among the Hybrids than with the Open Pollinated.

A test for standing was provided by a 55-mile wind which put many fields in a straw-broken condition, without the aid of the corn borer. Many fields were a tangled mess and machines left as high as 30 bu. per acre in the fields in 1949. The 1948 picture showed as bad as 20 bu. per acre left in seed fields. This was picked up by hand and dried, but lowered germination to 80 when mixed with the standing seed. The 1949 results are not all in yet, but steel storage bins of 1948 corn reveal sprouted corn and much moisture. It is a well-known fact that Hybrid corn is bringing so much moisture to market that huge drying plants are now used to reduce moisture content—and still 1948 corn turned black in storage.

Hybrid stalks were a foot shorter than the Open Pollinated, and Hybrid ears were smaller and were poorly filled at both tips and butts. Position of ears of many Hybrids is now very un-uniform. Years of observation and two years of testing side by side have led us to the following conclusions:

1. The selection of seed by taking all the ears—both green and ripe—which can be artificially dried and all used for seed, has led to a demand for a longer season in which a green crop can mature. Hybrid crops of the past few years are bringing so much moisture to the market that huge drying plants are now in existence. Storage of corn is largely going out of the hands of the farmers as a result.

2. The selection of the riper ears only, for seed, will produce crops of corn at harvest time with less moisture and of better seed and feed condition, also facilitating storage.

3. The selection of the medium flat kernels of the middle section of the ear and the excluding of the other portions of the ear for seed will lead, or has already led, to crops of ears not well filled at either end. In contrast, the saving for seed of well filled ears and planting seed from the *entire* ear (excluding only bad or ill-formed kernels) will continue to insure a better filled ear at harvest time.

4. Since tests have proved that the tassels contain more vitamins than the ears, it is evident that they should not be discarded.

5. Bull rows (the rows which are left to do all the pollinating in a hybrid seed field) have been found to have more perfect ears and better-standing stalks than the de-tasseled portion of the field which is producing the Hybrid corn seed.

6. Our conclusion here is that the continued de-tasseling of seed corn will, and has to an extent already degenerated our varieties to a point of less feed value. It evidently cripples a variety for picking up a *balanced* ration out of any soil, to de-tassel the stalk which produces the seed. The Nebraska Sta-

tion reports in *Bulletin No.* 144 that feeding Open Pollinated corn (in comparison to Hybrid) made chicks gain faster and have more protein in the meat in the end. It is interesting also to note that Hybrid sweet corn in most varieties is no longer sweet. Also that Open Pollinated corn put into silos made silage of far superior quality as compared to Hybrids.

7. Since we find that when the reproductive element is left out of food—as in the case of germs of grain—such grain is lacking in essential food values, we then conclude that the de-tasseling of corn which alters the reproductive power of the seed also alters the quality of that corn for feed.

8. We further conclude that when only about 1/5 of the Hybrid seed field is used to pollinate the other 4/5 of the field or all of that field which goes for seed, we are running further into a production of an inferior corn crop.

9. Throughout all nature, reproduction is the proof of life and is the end result that is provided for in a plant or animal. Without reproduction, that plant or that animal becomes extinct. Reproductive power in animals is closely related to the reproductive power of the plants which these animals eat. So when we use a variety which will not reproduce itself, such as Hybrid corn, we are undermining the health of the animal which consumes that plant to support itself in life or strength. If this law holds good in regard to the domestic animals it will surely hold good also for the human race.

10. The profit motive has brought Hybrid corn into existence. Hybrid is known to be more demanding on trace elements of soils and is therefore more of a fertility-consuming crop than the natural Open Pollinated. The Middle West is in an uproar over the corn borer. The exhaustive demands of Hybrid corn have led to more infestation by this pest and by various diseases.

11. Hybrid corn is a very poor answer to the cry for greater yields. It has brought on more poison spray, which has not proved a *cure* in any case. So the vicious cycle is accelerated.

12. We have been thoroughly convinced, beyond a reasonable doubt, that corn can be improved only by field selection and by the *organic methods* applied to the soil on which it is grown.

13. We are fully convinced that de-tasseling is not in Nature's plan for improvement, and the fact that Hybrids do not reproduce themselves proves to us that we are only putting off the day of reckoning and are providing only an inferior product. And we further believe that if there is a surplus of quantity at this time, there is not now, and never will be, a surplus of quality of corn. And the answer to the yield problem is new soil from the *cycle of life* and not new varieties.

FOOD: WHERE DOES YOURS COME FROM? PART III

S. W. EDWARDS

(*For Parts I and II see BIO-DYNAMICS. Vol. VII, No. 1 and Vol. VII, No. 2, which should be read before continuing with this series.*)

It is beginning to be generally recognized again that when you cheapen foods—unthinkable to good cooks of previous generations—by using powd-

ered milk and other powdered products; synthetic flavorings; cheap, white flours; hydrogenated or artificial fats; and the other wretched substitutes of the food manufacturer's art, you are only cheating yourself. You are not saving anything! And when you substitute for basic foods so much of the trash easily available on the markets of the country, you like-wise embark on a program which may cost you far more than you can afford in terms of physician's and dentist's bills.

Not long ago we were invited to a birthday dinner. The cake was prepared by a guest who beamed with pride over its appearance. She was delighted to say "I made the cake from a cake package and the icing from a package also. Why should I spend time making a cake when I can get it all at the store." A neighbor not too far away tells us she uses package goods for all her Xmas preparations. Nevertheless, two dripping tablespoons of whole wheat cereal combined with honey and cream may prove of far more value in the working day than the entire box of crunchy wispy-woofies that a neighbor consumes for breakfast and yet feels empty.

How many American families are fed by a package method similar to the above? The principle of good food preparation, therefore, needs to be enunciated once again: To prepare good eatables for the family, one must use the best ingredients. Therefore, one puts fresh eggs, rich milk and honey into the birthday cake batter. A cook we had years ago said "When you make a good butter-scotch pie, you close your eyes as you put in the butter."

Rules to live by, epigrams, illustrations and "designs for living" considered above are, alas, not of too great moment in the abstract. Only when applied to the daily routine of food preparation in the home will their significance, correctness or value in healthful living be tested and found worthwhile or not for the individual. Not too much is to be expected, one may say, by abrupt, unplanned switches to basic foods on the part of those of the middle years; minor benefits, of course, may appear almost overnight. It is with the young and growing animal, four-legged and human, that these changes in diet produce often spectacular results in short order. The stamina, staying qualities, regularity in conduct, and general all around well-being of children raised on basic foods can be quickly pointed out to you by any competent worker with children, teacher or child specialist, who, at the same time, can put a quick finger on the general listlessness, low energy and inability to forge ahead of the store-counter-starch-and-sugar-fed young ones standing rather uncertainly around on the fringes of dynamic group activity. There must be a reason, somewhere!

Buttermilk. Used in making cornmeal griddle cakes, and for drinking, buttermilk is a good food which has as many different tastes and flavors as there are farm women who make it. In books and government bulletins on the subject one will learn much about sweet cream butter and sour cream butter. The rest you will have to get by witnessing the mechanical operations of churning on the spot, say in the large butter plant, in the small local butter factory, in the farm dairy, and in your neighbor's kitchen when she makes a

quarter pound pat from bottled cream off the milk wagon, as was the practice during World War II.

That commercial butter is often improperly made under extremely unsanitary or filthy conditions will be readily noted in most any issue of *Notices.*[1] Thus it may be that for those who do not produce their own, the best source of butter and buttermilk will be from such a farm set-up as considered under *Cream* in Part I of this series.

Cornmeal. For those who do not grow and grind their own corn, the purchase of clean, fresh meal in the market is generally impossible. Since cornmeal is a most valuable basic food every effort should be made to find a suitable source. By taking your own basket in season, you can have the farmer husk into it from the shock. When later dried and shelled at home even so simple a mill as a coffee grinder will produce cornmeal.

Good corn grows in fertile soil on compost, without commercial fertilizers. Thus, you should look for properly grown yellow field corn, open-pollinated, and of known ancestry if you want the best. Much of the meal on the counters today is simply yellow starch and little else.

Meat. A large part of the urban family's food budget goes for meat, an item whose origin and quality remains obscure for most buyers; one is only familiar with its short history from the meat counter to the oven; of the birth, growth, pasturing, fattening and marketing of the animal itself, the buyer of one or more of its component parts knows nothing.

It has long been our contention that the best beef can be raised locally, on a fertile farm of lush pastures, Bio-Dynamic or organic in composition. A considerable volume of evidence has slowly accumulated which forces upon the student of meat sources the inescapable conclusion that our western beeves under feed lot practice do not make good meat. Such meat may rank high on the government grading scales, based as these scales are on such superficial testing as one-look-with-the-eye and one-poke-with-the-finger. Not yet have we even considered grades for meat which define it in terms of health history, ancestry, quality of feeds, fertility of pastures, and analysis of meat content health factors.

Now quite often, one who does not raise his own yearly beef, can find with some effort, a grower who will sell a quarter or a half. In our section some one always raises a good steer and is ready to part with a quarter. This may be canned, lockered or refrigerated at home. In sections with steady winters, a beef need only be hung in a safe place. (For properly dressing good beef, see *Bio-Dynamics,* Vol. III, No. 2 "Slaughtering Home Raised Beef" by Roger D. Hale.)

It seems most satisfying for our family to know that its winter beef has not come from airplane sprayed pastures, has not been stuffed on similarly sprayed hybrid corn, has not as a calf been raised by prescription, is not a section of cutter-canner-cow, and has not worn a coat of chemical sprays during much of its growing-up period. We look forward to the day when

(1). **Notices of Judgment.** Publication of the Food and Drug Administration, Federal Security Agency, Washington, D. C. Issued one or more times a month. Your name will be put on the mailing list free.

our present building program is behind us and we can raise our own beef in like manner.

Summary. We must emphasize that, as we see it, the prime purpose of the B-D movement is to promote healthy soils which produce healthy crops, healthy animals and thus nurture good health in human beings. And for the present, until all soils are B-D or the equivalent, most families, by some study and effort, can improve their diet in small or large measure by slowly acquiring suitable basic food sources of supply. Bio-Dynamic wheat may be had from two sources in this magazine. Its use can be a good beginning for the family without fields. And from wheat thus acquired, the family can go on to honey, raw sugar, black molasses, B-D oranges, cornmeal; unsulphured figs and raisins; fresh milk and cream; B-D vegetables, fruits, herbs; and natural brown rice.

BIO-DYNAMIC SPRAY 500

EVELYN SPEIDEN

The Bio-Dynamic sprays are life-giving rather than killing sprays, and are thus just the opposite of most sprays with which the public is familiar. Hence, we have been cautious in urging their application, since to use them wisely implies a new point of view—that of working with nature to restore balances we have upset and to bring an increasing measure of health to plants, animals and man. Attention is focused on the upbuilding processes of life and health rather than on a battle with disease and death. Eventually we can even forget about fungus attacks on plants, insect pests, animal diseases, sometimes many human ills and ailments, because they gradually disappear or recede to a minor place that makes it unnecessary to bother about them. Of course, radical and far-reaching changes do not take place in a day or a week, whether in our habitual ways of looking at things, in our practical habits of dealing with natural problems, or in the reaction of nature to our efforts. It takes time, patience, persistence—as well as enthusiasm.

For convenience, our sprays were given numbers years ago—500, 501, and 508—just as the other preparations used in the fermentation of compost and manure are numbered 502 to 507. All these nine preparations supplement each other. To get the very finest effects of the Bio-Dynamic method, it is necessary to have the interaction of them all, to learn how to use and what to expect from each one—a tremendously vital and interesting study. But especially important is it that the influence of the sprays be backed by that of prepared compost or manure, which has been broken down by 502 to 507 and then spread on the land. Since an increasing number of farmers and gardeners have been using the 502 to 507, it seems time now to talk more about the next step, the use of spray 500.

Perhaps you are asking: "How do I know when my place is ready for 500?" This is an important question. Strange as it may seem, it is possible to reduce your crop by the wrong use of 500. Its effect is to stimulate the growth and activity of the many minute forms of life in the soil and thus to en-

courage seed germination and the development of the finest plant roots. If it is used on a mineralized soil—that is, a soil lacking in humus—where there is not enough food for these stimulated organisms and the growing plants, the soil organisms are likely to make use of the available food at the expense of the growing crop. This causes no permanent harm, but a temporary setback which has sometimes been decidedly discouraging, and has led more than one novice to decide against pursuing the Bio-Dynamic method further. So be warned—spread your good compost or manure first on the area where you propose to use 500; make sure you have a humus basis on which to build.

"How can I keep the 500 if I am not able to use it at once?" Over and over again, this question pops up. When you order a portion of 500 (which is 1½ oz. and sufficient for an acre of soil), to be able to care for it properly on arrival is as important as to give the right attention to a precious plant received from a nursery. The 500 can as readily be made useless by neglect. It is approximately half a cup of velvety-soft, rich brown, moist material, looking and smelling like the most beautiful soil you ever saw. Never would you guess that it is made from pure, fresh manure from pasture-fed, healthy cows. It is now the finest humus, full of invaluable, innumerable and infinitesimal forms of life which you must preserve carefully if you would transfer them to your garden soil. If you recall that humus is preserved by moisture, coolness, darkness and access to air—destroyed by drying wind, heat, flood or drought and direct sunlight—you will have hints as to the care of your 500. It is not so different from what you would give to a delicate plant. Remove at once from its traveling containers. Pack it loosely in an earthenware or glass jar, not much too large for it. Cover but do not seal. Now bury the jar in *plenty* of moist earth and *keep* the earth *moist*, not wet. Do not wet the 500 directly. Treated thus, it will keep for some time. It is better, however, to use it soon after arrival, that is, not to order until you are nearly ready for it. It keeps better in quantity than in small amounts. Once it gets thoroughly dry, throw it away; don't waste time writing to ask what you can do with it then, for it has lost its value beyond possibility of recall.

Answers to the next questions you can probably guess: "What season, in what kind of weather, and at what time of day should it be used?" Yes, the season is whenever you sow seed or transplant, generally Spring or Fall. The ideal is to spray the prepared seed bed just before sowing the seed. Then the slight stirring of the soil after planting will mix it in sufficiently. Soil in condition for planting—neither too wet nor too dry, is also right for 500. To spray it on a very dry soil is useless, also in, or immediately before or after, a rain. Perhaps you are wondering, "If I spray the soil just before planting, it may be too wet to handle." The 500 is spread far too lightly really to wet the ground. Imagine 3 gallons of water spread over an acre in a fine mist spray. You can see that such a delicate operation also sets limits to the weather and the time of day. A strong wind would blow it away, strong sun would evaporate it before it could start its work. A quiet, overcast day is preferable and towards evening is the best hour.

Forethought in providing rainwater is necessary if you live in a place where your water supply is treated with chemicals. Chlorine may be evaporated off by exposing water to several hours of sunlight, but other chemicals are not so easy to dispose of. Three gallons of rainwater (for one portion) is not so difficult to get if one plans ahead. Brook or spring water may be used if uncontaminated and if warmed to about blood heat.

To prepare the spray, combine the 1½ oz. of humus-like material with the three gallons of water and stir for one hour—yes, one whole hour. Neither more nor less will bring about the desired result, according to many tests which Dr. Pfeiffer has made. The activation of the material by the incorporation of oxygen is at its height just at the end of an hour. With more stirring it deteriorates, also with standing after the completion of the stirring. The sooner it is sprayed out the better. After three hours it has lost much of its value. Overnight standing makes it worthless. Of course, the equipment used for stirring and spraying must be clean and free from any residues of chemical or poison sprays. To get rid of these, Dr. Pfeiffer gives the following instructions for cleaning:

Flush out with warm water four times.
Flush out with water containing lye, 2% solution, twice.
Flush out with water containing hydrochloric acid, 1% solution.
Flush out with clean, warm water at least five times.
If any rust or residue is left, start the above process all over again.
Perhaps it would be easier to buy a new sprayer.

The container used for stirring needs to be large enough so that vigorous stirring will not splash out the liquid. A heavy earthenware crock with straight sides is about the best thing. Two, or even three portions, may be stirred at once in a larger container, but this is about as much as one can do by hand. You will find by experience what kind of stirring stick you prefer. Some people like to stand up to the job and use a long stick. Others prefer to sit and use a short stick, stirring with a motion direct from the shoulder. To get the maximum amount of oxygen into the liquid, stirring must be of a special kind—quick motions around the edge of the container, bringing the stick gradually towards the center as the speed increases and the funnel or whirlpool in the center reaches to the bottom. Then a quick *reversal* of the direction tumbles the liquid over the center enclosing the air. This change in the stirring directon takes place every few seconds, as soon as the funnel is complete. Although vigorous and rapid, the stirring should also be steady and rhythmical, not sporadic. Many people find it easier to change the stick from one hand to the other with each change of direction, thus giving frequent rests to each hand. With practice it *is* possible to use both hands almost equally well.

For the small home garden, the easiest way to apply the spray is with a bucket and whisk broom. However, a simple sprayer making possible a fine mist spray (the liquid will have to be strained into the sprayer) is even better. The same sprayer may be used for all of the Bio-Dynamic sprays by rinsing out between each use. It is, however, far safer to keep this sprayer for

these sprays only, as any strong residue may seriously affect their efficiency. To cover an acre with the 3 gallons of liquid it is necessary for the person spraying to walk rapidly up and down the field. The 500 may well be applied both Spring and Fall on all land previously dressed with compost or manure. This can be done in a garden or other intensely cultivated area, but usually time and labor will not permit so frequent an application in field work. However, even here it should be used *at least* once a year. Each successive application may be somewhat more dilute. Dr. Pfeiffer's fields at Chester, N. Y., which have now had applications for several years, are getting about five portions to twenty gallons of water over about 8 acres. Also it has been found that the larger the area being treated bio-dynamically, the more dilute the preparations may be—that is, there is a cumulative effect with increasing acreage. It is possible too, to reach a condition where all these fertility practices may need to be temporarily discontinued. This state was reached after three years in the herb garden at Chester. All the Bio-Dynamic practices had been carried on intensively. The soil was well covered with vegetation, and so protected from the drying influences that are destructive of humus. The soil had become darker each year and the vegetation so luxuriant that Dr. Pfeiffer advised discontinuing both compost and sprays for a season.

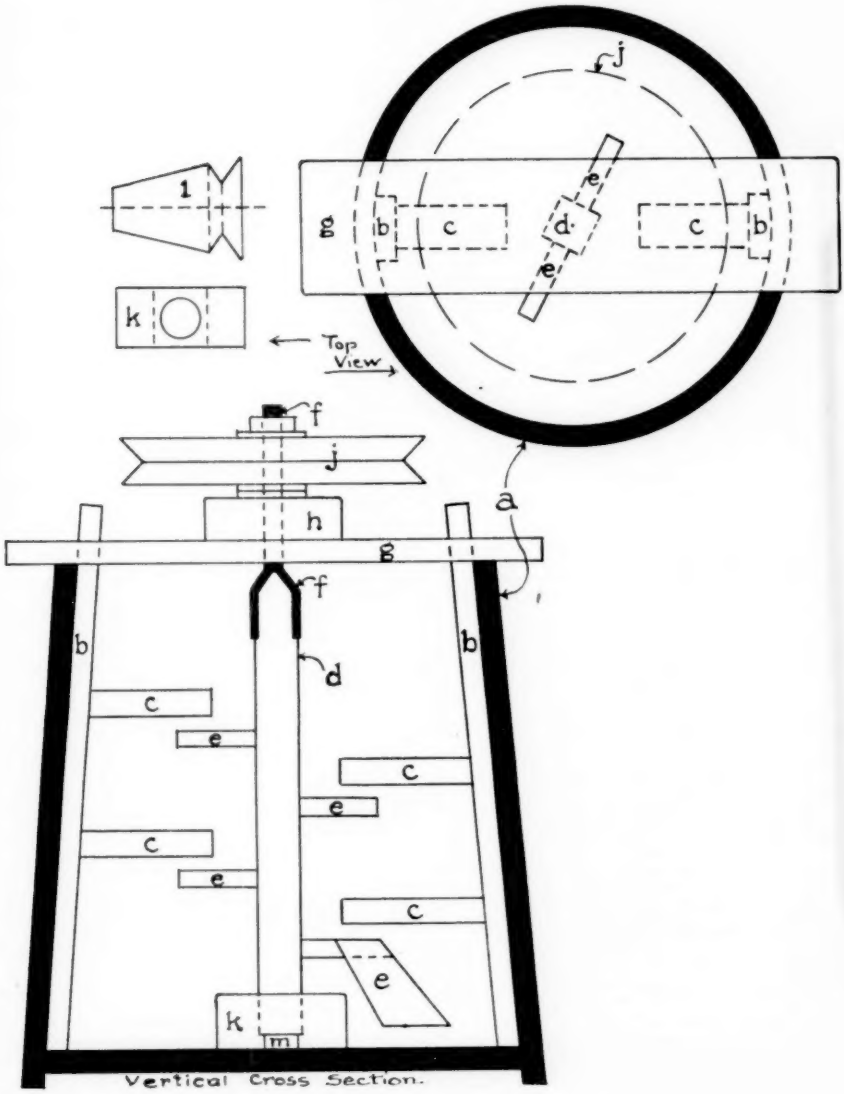
Mr. G. B. Winkfield, Advisor in New Zealand, with the Spray Stirrer Developed There.

A spray discussion never gets very far before someone asks, "But can't we use a machine for this stirring instead of doing it all by hand?" The answer is "Yes, *provided* you get the right sort of machine." Many kinds have been tried, a few have been found effective. Dr. Pfeiffer has made many tests of sprays stirred in many ways and he feels that it is better to use a machine and get the 500 on the fields than to put it off year after year because time and labor make hand stirring out of the question. It is doubtlessly true that the acme of perfection can be reached in no other way quite so well as by hand stirring. The person with a small garden and only an acre or so of land, who can just as well use the hand method, will always have some advantage over the large owner who is forced by circumstances to use a machine. Yet the use of the machine is far preferable to the neglect of this important phase of Bio-Dynamic activity.

The first trend towards quantity production came with the type of machine here illustrated with Mr. Winkfield. The containers are evidently movable and can be picked up and emptied, and the machine itself can be moved from place to place. A modified form of this is an arrangement of containers set in cement and placed high enough to allow for emptying the liquid into a bucket below. The stirring rod can also be suspended from a porch roof or other ceiling. The four containers may be large enough to hold two portions each, thus providing eight portions at one stirring. For a large acreage it has also been found feasible to stir a concentrated solution in this way for one half hour, then to transfer it to the large tank of a power sprayer, dilute it to the proper strength and give it the second half hour of stirring with the rod of the power machine as it travels to the field. In one day a hundred and twenty-five to a hundred and forty acres can be sprayed in this way.

In Denmark since the war, far more 500 has been used than in any other country of which we have heard. They have developed and successfully used the machine shown below in design. It is made of wood, No. 1 fir, except for (h), (d) and (k) which are hardwood. Metal is used only at the top and screws are inserted from outside so that metal does not come in contact with the liquid stirred. Placed opposite to each other in the barrel (a), are two vertical beams (b), each with two sticks (c), attached to make whirlpools in the liquid. The vertical axis (d) is square with slightly rounded corners and has four *round* mixing sticks (e), the lowest one having a wooden blade so that small amounts may be stirred. To the top of (d) is fitted (f) which is made of iron. The bearing (h) is fastened to board (g), and these are held in place by beams (b) which pass through two holes in the board. Note that (g) is not a cover as the liquid must be open to air while being stirred. The top and axis may be lifted out for emptying the barrel. Between (j) and (h) are two iron disks which must be kept oiled, but only *moderately*, so that *no* oil gets into the liquid. The lower end of (d) is rounded and rests in the bottom bearing (k), which has hollow (m) to absorb sand and prevent wear.

The machine can mix a little better than 25 gallons and should be tested and regulated to get the correct speed. This should be sufficient to form whirlpools everywhere with a little foam, but it must not whip up the liquid until it looks like the wake of a ship, as this would ruin the preparation. The length of the sticks (e) is important to the speed and a quarter of an inch more or less makes a great difference. The normal



Design of Machine Used in Denmark.

length is about 3½ inches, which gives an idea of the *scale* of the whole drawing. During testing make sure that none of the sticks work at the surface of the water.

The speed is calculated to be about 225 revolutions per minute, but 100 revolutions will do the job, and cause less wear. If the mixing is done by crank handle, the latter speed is preferable, but in this case the sticks must be about 5 inches long and thicker than otherwise. If the motor used makes about 1200 revolutions per minute, a wooden cone (1) is fastened to the motor to give the correct speed and not make it necessary to have (j) too large.

There is no patent on this machine but the Bio-Dynamic advisor for Denmark, Mr. O. E. Rasmussen, Roedbjerggaard, Hornback, Denmark would greatly appreciate suggestions for its improvement from those who use it.

The most recent efforts towards mechanical stirring in this country have been with washing machines, and here the most important thing to remember is that the washing machine must be *well* cleaned out if it has been used for laundry purposes. Also, the lid must be left off during stirring. By repeated testing it has been found that a machine which has a central agitator that is spiral-shaped is the only suitable kind. The Apex machine is of this type and one of our Association members, who is connected with this company, has worked out an adaptation of this machine, which can be purchased through the Association. This adapted stirrer has no wringer, however, so that although it can also be used for laundry it may not be so convenient. If one can afford a separate spray mixer, this is the ideal, and it is more reasonable in price than a regular washing machine. The latter, of course, may be purchased on the market, but should have a strong motor in order to stir for the full hour. Another of our members is working on the adaptation of a washing machine and perhaps by another Conference time we may have more to tell.

By whatever means the 500—and the other sprays—are prepared for use*, it is important to remember that while their value is scientifically demonstrated by Dr. Pfeiffer's research work, their most effective use is only to be achieved if they are thought of as belonging in that large group of activities often called "the ART of farming." No amount of writing can give the farmer or gardener what will compare with the experience he gains by his own efforts, and there are few satisfactions to compare with those one may have when working with nature becomes a fine art. The use of the Bio-Dynamic method begins to be a "joy" instead of an extra job when one reaches the stage of making use of its finer points and watching the delicate wonders that it is possible to accomplish.

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* For further information about the use of 500, see the leaflet on "Bio-Dynamic Sprays" available for 15c at the Bio-Dynamic Farming & Gardening Association, Inc., R. D. 1, Chester, N. Y.

FORESTRY OR FAMINE?*

By ROLF GARDINER

Worse than Recurrent Wars or the Atom Bomb is the Exhaustion of the Earth's Resources

(*In this intensely absorbing opening address originally given by Mr. Rolf Gardiner at the Forestry Week in Dublin on July* 19th, 1948, *the consequences of the colossal abuse of man's heritage are strikingly expressed. The necessity of re-afforestation to avoid the overwhelming of life on earth is stressed with emphasis.*)

EXHAUSTION OF NATURAL RESOURCES

To an increasing number of well-informed men and women the truth is dawning that mankind's future is made questionable neither by recurring modern wars, nor even by the misuse of atomic energy, but by something more fundamental: the exhaustion of the natural resources of the earth. To the nineteenth century such a possibility was inconceivable. In every part of the world there were yet untapped reserves, vast hinterlands of potential wealth. To-day, with a still increasing world population, with a rising clamour for higher standards of nutrition, and with the spread of industrial civilization to every corner of the globe, a totally novel situation is being reached. There is no continent which is not being ravaged by the effects of soil erosion and depleted fertility, while from the subsoil, coal, iron, and oil are being consumed in ever greater quantities.

Modern civilization has become a Moloch, devouring the natural resources of the earth with reckless unconcern for posterity, and a total lack of gratitude for the pastures of human subsistence. Against this colossal abuse of man's heritage the counsels of the wise and far-sighted are rightly being urged, and a movement is slowly gaining force which promises to become the conscience of mankind and to restore the spirit of husbandry now usurped by that of expedience. If this counter-movement does not succeed in redressing the atomic tendencies of continuous exploitation, cumulative disaster will overwhelm life on the earth, and our planet may well become as bald and barren as the mountains of the moon.

FORESTS AND THE SOIL

Forests and rivers are the parents of civilization, and the intimate connection of these two great natural agencies has often been described. "Rule mountain, rule river; rule river, rule country," is an ancient maxim of the Japanese who, at heart, may have never preferred the banditry of war to their ancestral care of the land. The forests of the hills absorb the rainfall of the clouds and redistribute the beneficent moisture by the conduits of streams and rivers to the valleys and plains. The vast cycle of water, passing back and forth from sea to heaven, from heaven to earth, and from earth to sea,

*From a pamphlet published in London, 1949—Rudolf Steiner Publishing Co., 54 Bloomsbury Street W.C.I.

is under the regal control of the forests; for these determine the *tempo and rhythm of this mysterious circuit upon which all life depends.* Remove or diminish that control and what disasters ensue: raging torrents invade the valleys, leaving behind them wreckage of the soil, floods overwhelm the lowlands and silt-up the estuaries; the wealth of the mountains is discharged upon the sea and, the storms subsiding, drought stalks through an eroded land. Such disasters are as old as Plato, who described them in his *Critias;* they are as old as the many vanished civilizations which have sometime garnished the earth. But to-day there is no part of the earth which is immune from such catastrophe: civilization is universal, the spirit of exploitation general, and the means of it more ingenious and powerful than at any previous period of history. Hence husbandry begins with care of the forests on which the very soils depend both for evenly distributed moisture and for that replenishment of humus without which nothing can grow.

European civilization is derived from forest soils, and our cities and cultivated lands are clearings in what was chiefly deciduous woodland. In the north, the pine and spruce are mixed with birch and alder; in the centre stretches the broad deciduous belt of oak, ash, and beech; then again come the coniferous woodlands of the northern slopes of the Alps, the larch, but also silver fir, with beech and pine and spruce, and on the Mediterranean side the chestnut, poplar, cypress, olive, and ilex. Britain, south of the border, falls within the deciduous zone of oak, ash, beech, and wych elm. But other trees have immigrated since time immemorial, and it is as difficult to disinter the native forest skeleton as it is the foundation stock of the native race. The art of the forester partly consists in blending species which will thrive together in sympathetic support of one another and the whole, and in excluding species which are either unsuitable to the district and likely to misaffect the soil or which will overrule the more valuable trees. An ill-considered forest policy will achieve the opposite results: thus the exclusive planting of pine in parts of North-east Germany a century ago extinguished the native oak and beech forests, and led to a deterioration of the soil, while at home in the New Forest the planting of pines as shelter-belts since 1776 or earlier has led to the weed-like spread of this species over the "lawns" of the heath, to the progressive ousting of the beech and healthy oak, and to an increasingly acid condition of the soil. Man is constantly interfering with nature; nature is constantly taking revenge on man. The art of husbandry is co-operation between the two to maintain a harmonious condition of balance.

How quickly the matrix of the ancient world, the Mediterranean basin, began to attain its present desiccated and denuded condition we do not know. Perhaps the use of metal and the need for consuming much wood in the process of smelting hastened the process; the expansion of trade requiring increasing numbers of timber-built ships was another factor. (In a later time Doge Dandolo slaughtered the forests of the Dalmatian coast in order to build Venice and her fleets. But to-day we know that these Mediterranean lands, scrupulously terraced and cultivated for centuries, are a mere skeleton of their former selves. There is not a Mediterranean country except Egypt

[whose mounting population will soon be faced with grave problems] which to-day does not have to buy corn from far away.)

The English Monasteries and the Woods

As the Mediterranean civilizations, which achieved their apotheosis under the Roman Empire, sank into a decline, the genius of the south travelled northwards over the Alps to incarnate in the fresh forms of Gothic Christendom. This was the hub of the civilized world of the past fifteen hundred years, the Christendom of Northern Europe. Out of its unexhausted forests and fenland soils, favoured by the climate of a temperate zone, a new civilization arose. It began in the forest-clearings, on the drained swamps and fens of the river-mouths and valleys. The pioneers of the new development were the Religious Orders, especially the Cistercians, whose feats of colonization ranged far into the eastern marchlands, and behind them, the Manors of the Feudal Age. English woodlands of to-day are the descendants of the manorial waste of the Feudal System. Until the seventeenth century the abundant forests sufficed as the unexhausted reserves of soil fertility, wild life, and pasturage. The Lord of the Manor or the King (who alone owned "forests" proper) kept the rights of the chase; the commoners had rights of pasturage for swine and cattle, where these did not encroach upon the needs of the royal or baronial deer; timber continued to be exploited for building and fuel, and the woods ebbed slowly as the cultivated lands increased. Then came the development of England as a maritime power, and the demands on timber for shipbuilding made drastic inroads into the forest reserves. Early legislation had protected "encoppicements," the underwood of hazel, ash, and chestnut, against browsing cattle and deer. The Statute of Woods of 1543 ordered the replanting of forest trees "to cure the spoils and devastations that have been made in the woods," this despoliation having largely ensued on the dissolution of the monasteries, when their extensive woodlands passed into other less scrupulous hands.

The Subsequent Story

Queen Elizabeth's surveyors, Roger Taverner and his son John, who followed him, made surveys of the woodlands, and described the beginnings of the "coppice with standards" system, which first succeeded wild woodland, the protected underwood being set with seeds of oak and beech (with thorn as a protective cover). In Charles II's reign, alarm at the diminishing woodlands led to a survey being made on behalf of the newly founded Royal Society by its reporter, John Evelyn. His *Sylva,* published in 1664, was the first lengthy discourse on the management of woods, not for hunting but for the replacement of timber reserves. From this time onwards, woodlands were enclosed for the protection of trees and their natural or artificial reproduction.

Throughout Southern England these woods consisted of coppices with oak and ash standards, usually sown or planted in lines fairly well apart. The coppice was cut on an eight to twelve years' rotation for charcoal and hurdle making, turnery wood and fencing; the standards were left to grow—

in the case of oak for a hundred and twenty years. The mature oak woods which are being felled to-day were planted during the Napoleonic wars. Most of the trees are rather short in timber length owing to the wide spacing allowed by the coppice system. This was suitable in the days of wooden shipbuilding, which required "knees" and "bends" for the curved parts of the boats; it is neither ideal silviculture nor does it yield the maximum amount of timber of which the soil is capable. On the Continent the coppice system was superseded early in the nineteenth century by more strictly silvicultural or economic systems aiming at maximum or sustained yields of timber. In England the coppice system lingered on, because timber could be cheaply imported from the Baltic or from America, and because landowners were coming to regard their woodlands more and more from a purely sporting point of view. As agriculture and rural industries decayed, the coppice became mismanaged, and was itself finally abandoned. The rabbit, sworn foe of all foresters, next destroyed the "stools" and saplings, while pheasants and pigeons devoured acorns and beechmast; thus a halt was called to natural regeneration. Enlightened landowners, however, continued to plant shelterbelts, spinneys and amenity woods, and, as these were chiefly on open ground and quick growth was desired, the coniferous species, such as larch and fir, were favoured, while the hardwoods slumbered on to be devastated in the wars of the present century. Now, too, the softwoods have been clear-felled to feed the mines with "props," while immature oak, ash, and chestnut, in fact, anything over three inches in diameter, is being ruthlessly slaughtered for the same purpose.

The Story of German Forestry

The conversion of the coppice-with-standards woodlands to high forest has been a large part of the story of continental forestry during the past hundred years. The old system was practised in Germany, according to some authorities, as early as the sixteenth century. As the population increased and industries developed, the inroads into the timber resources became more and more severe, and many forests were depleted or spoilt. Early in the nineteenth century a new scientific system of forest management was introduced by Heinrich von Cotta (1763-1844, Director of the Forest Academy at Tharandt, Saxony). This was the system of clear-cutting and direct replanting in order to obtain the quickest financial returns from fast-growing coniferous timber. In effect, the native woods of spruce, silver fir, Scots pine, and beech were clear-felled and replanted with pure spruce, the object being the more economic management and quicker returns of the even-aged, uniform fir-forest. This policy was pursued for a time with great enthusiasm and thoroughness, and with undoubted immediate success, although Cotta himself viewed its indiscriminate adoption with alarm as early as 1820. The story of German forestry (admittedly the

pattern and pace-maker of all schools of silviculture)[1] throughout the subsequent century, has been one of increasing criticism of monocultural methods, of their progressive modification and modulation, and finally of their entire abandonment under the new Forest Law of 1934, which forbade clear-felling, and re-established the mixed or uneven-aged forest as a general principle.

The Parallel with Soil-Mining Agriculture

This story is of exceptional interest, because it forms a parallel with the so-called scientific extractive agriculture which came to dominate the farming of the great plains of America and Russia. The planting of pure spruce or pine forests led eventually to every sort of trouble and disbalance; destruction by fires, pests, insects, and infections; *the deterioration of the forest soils by desiccation or increasing acidity; the exhaustion of humus by exposure of the soil during the clear-cutting intervals and by the absence of litter and leaf-fall from mixed species and soil-improving trees such as the beech;* a decline in yield and quality *through the gradual weakening of the spruce or pine types now the parents of successive tree-generations;* in short all the *retributive ills which ensue wherever nature is enslaved and treated as a factory.*

Collaboration with Nature instead of Exploitation

The evolving of better methods, aiming at mixed woods, naturally generated by skilful opening of the tree canopy (enabling the thinned-out and selected mother-trees and the wind to perform the work elsewhere done by laborious hand-planting), is a fascinating tale. These methods, the "uniform," "group," "irregular shelter wood," "strip," and "wedge" systems, carry the names of highly-skilled German, Austrian, and Swiss foreigners, which are household words to the trained silviculturalist. But at the end of this extraordinarily elaborate journey we arrive back at the conception of "Dauerwald" or "continuous forest," maintained by natural regeneration and selective fellings, in which the forester copies and collaborates with nature, guiding and supporting her with a light hand. A parallel conclusion is being reached by the advanced schools of ley-farming, which seek to establish swards containing not only productive commercial grasses and clovers, but also herbs and weeds whose presence is now found to exert a subtle influence both on the grass mixtures and the soil, and consequently on the health of the stock supported by them. Such systems, silvicultural and agricultural, are, of course, far from pure reversion to haphazard *laissez-faire*: they require infinite skill and judgment. The return to more natural methods is a cultural, not a barbaric process, deliberate rather than romantic. In organic silviculture there persists the great technical problem of obtaining regeneration of

[1] The French and Swiss schools of forestry have throughout tended to follow the German model, and there are some fine examples of silviculture in France, where "jardinage" (the selection system) is practised in mountainous regions such as the Jura and Vosges. In Scandinavia, especially Finland and Sweden, there are highly scientific schools of forestry which pay great attention to ecological factors. Holland and Denmark, not usually thought of as forest countries, have a higher proportion of land under cultivated woods than Britain, and their farmers are taught to tend their farm woodlots and shelter-belts as seriously as their fields. In Eastern Europe there is less and less real forestry, except in Czechoslovakia and parts of Hungary and Poland, where German influence and example have been at work. The Russians have treated their vast forests as "lumber" to be exploited and exported. Before the recent war they felled a vast belt along their western frontier for strategic reasons with appalling and far-reaching results.

two dissimilar types of trees, the light-demanding species such as oak, ash, larch, pine, and spruce, and the shade-bearing beech, silver fir, hornbeam, and cedars, and of preventing all "continuous" woods from becoming dominated by the latter.

English Methods are Out of Date

It is a sad reflection on the backwardness and insularity of English policy that, whereas on the Continent every sort of attempt has been made first to modify and finally to overthrow, monocultures, at home both the British Timber Trade and the Forestry Commission have been allowed to pursue the short-sighted methods of clear-felling. Moreover, wherever forestry is practised, planting is accepted as the normal method of regenerating woods. Apart from a few exceptional private estates, there is no silvicultural system in practice worthy of the name. Our forestry management by and large is haphazard, happy-go-lucky, opportunistic. The Forestry Commission, planting bare land with a policy aiming at maximum timber production, and with mere side glances at other rural factors, has adopted monocultural methods, and even-aged woods. If it had observed its original terms of reference it might have aided landowners to evolve silvicultural systems suited to the immemorial woodland soils of England and Wales. These soils are, on the whole, more kindly and suitable to the growing of trees, the climate with its higher rainfall, more equable than the Continent's. Indeed, if ever there was a country of trees, it is England. Nowhere do individual trees and spinneys grow more healthily and graciously; nowhere is such an astonishing variety of species possible. Yet our woodlands are the victims of pitiful mismanagement and neglect, for which the impoverished landowner carries only half the blame. Now the State, rightly concerned, proposes wide-scale interference through a Department with only twenty-eight years' experience of forestry, and imbued with a silvicultural outlook which is, by all continental standards, a hundred years out of date.

The British Forestry Commission has proposed the establishment of five million acres of woodland in England, Scotland, and Wales, of which about three million acres will be planted on agricultural or bare land, and two million acres on traditional woodland sites. The greater part of this forest area will be under State control and in State ownership. Landowners are, however, to be given the chance of "dedicating" their woodlands to proper forestry; in return for which they will receive critical advice and financial assistance. The final organization of this ambitious plan is not yet determined, and without adequate guarantee and some sensible price-fixing machinery, the landowners are naturally chary of "dedicating."

Dangers of Centralization

Moreover, the dangers of a central specialized direction are clear. A Forestry Department in Britain will tend to ignore the wider landscape and rural values which are inherent in any organic pattern. If it correlates woodlands with agriculture it will be by negotiation rather than by the homely local knowledge of resident landowners. It may, indeed, ignore local needs and disregard all those issues inseparable from the organic approach in plan-

ning, such as the planting of woods to regulate water flow and to maintain soil humidity on farm land; the provision of shelter-belts and spinneys for the protection and sustenance of stock and growing crops; the cultivation of coppice and small woods for supplying the needs of local village industries. In fine, its dominant policy will just be: the production of timber as fast and as cheaply as possible. To assume this is not to jeer at the zeal of a Civil Service Department; it is to forewarn optimists of what may be inevitable now that we have handed over forestry to a single specialized authority.

Co-operative Forestry Groups

Meanwhile, in some parts of England and Scotland, the private landowners are not being idle. Co-operative forestry groups are being formed whereby a number of adjacent estates combine to share a forester. This officer is responsible to the individual owners for the drawing-up of working plans, for the organization of labour for clearing and planting, for the marketing of woodland produce and the establishment of nurseries. Resources are pooled and shared, and a district or regional sense of responsibility is developed in the task of regenerating the neglected woodlands and correlating their restoration with the needs of the landscape. The Forestry Commission, already overburdened in its programme, has given encouragement to such co-operative groups and is even disposed to grant them financial support. Here may be the clue to the solution of the impoverished, and often ignorant, owners' difficulties. Experience has shown that such co-operative groups must not be too big, probably not larger than 2000 acres. But by this method a number of small properties, with woodlands which would be very costly to control by bureaucratic machinery, may receive supervision and encouragement. It is hoped that freehold farmers may be persuaded to join and learn, as in Denmark and other lands, the productive value of farm woodlots.

Forestry and Agriculture in Africa

The essential combination of agriculture with forestry is understood better in the Tropics than in the British Isles. In Africa, where soil erosion, due to felling of timber on the water-sheds, or to the periodic burning by native tribes of the bush, is a terrifying problem, astute farmers and estate managers have realized the fundamental importance of trees. Not only is the forest cover on the hills and along stream banks being rigorously conserved by natural resources ordinances—and the difficulties of enforcing these among tribes used to shifting cultivation, are formidable—but landowners are thinking in terms of dual rotation: of timber and crops. Old tobacco and maize land is being restored to forest; wind shelter-belts are planted with especial care and discrimination; cattle-kraals are made under the shade of blue-gums and other trees whose leaf-fall makes a precious litter and mulch for the beasts to tread, away from the sun's scorching rays. Trees with edible leaves and pods are kept or planted on pastures; while for tobacco-curing and tealeaf-withering large quantities of quickly-grown firewood are needed close to the barns. But in many African countries these measures are being taken far too late. Over wide stretches of Central and South Africa, land, which

once carried forest or veldt rich in game, is pitiably desiccated or scarred with gullies and chasms. The tropical deluges of rain take toll of such land with cataclysmic effect; dams are silted up, rivers are empty canals, river mouths become sewers discharging precious soil into the sea. General Smuts gave it as his considered opinion that unless soil erosion was rapidly halted, the population of the Union would be inescapably driven out of the interior to the coastal belt.

In Central Africa, fertile countries such as Kenya, Uganda, and Nyasaland are on the verge of starvation. The native populations, no longer in a position to practice shifting-cultivation without permanent exhaustion of the soil, are being penned into reserves, or "trust land," which, if not scrupulously terraced and controlled, rapidly erodes. Too many commercial crops are being grown at the expense of food crops, while the shortage of meat, due to the extinction of game and inadequate grazing of cattle, is causing serious protein deficiences in diet which, in their turn, lower the African capacity for work. Ground-nuts schemes, and similar projects for turning Central Africa into the larder of Europe, may defeat their own aim, unless the most careful foresight is exercised. As Colonel Walter Elliot put it: "You cannot hope to carry away loaded plates of food for export through throngs of hungry overseas populations nowadays." And despite Ordinances and Soil Conservation Acts there is still too much Soil *Conversation* instead of Soil *Conservation!*

Folly and Waste on Both Sides of the Iron Curtain

Such facts enhance the need to cultivate the dwindling sense of husbandry in over-industrialized Western Europe. Unless we restore the rural-urban balance, and that pretty soon, famine is certain. Beyond the Iron Curtain, the Slavs, under the despotic leadership of the Kremlin, are disrupting an age-old peasant economy of local self-subsistence. The folly and wastefulness of such a revolution will presently be seen. Not only does the dislocation of land-tenure, whether this be by the parcellation of big estates, or the collectivization of peasant holdings, undermine confidence and tradition, it destroys the religious sense of duty and faith in Divine Providence which have upheld the peasantry, in spite of poverty and catastrophe, for fifteen hundred years. In future these luckless yeomen will be the wage-slaves of an agro-industrial machine, controlled by bureaucrats and commissars. Religion will be displaced by a pseudo-scientific or political ideology. The last European people to maintain the connection between work and worship will be "emancipated," and the soil will become a plant-growth factory as it already has in the West.

Ireland's Opportunity

One Western country there is in which vigorous independence might still show the way to a saner way of life, and prove an example and an inspiration to a painfully reviving Christendom—Ireland. In Eire the morbid disease of industrialism has not yet poisoned the body of the people. The

salt has not yet lost its savour even in a sadly depopulated island. The statesmen of Eire have a great responsibility to pursue the modern development of Ireland without automatically copying the mistakes of England and America. May they remember that quality is more important than quantity, and that this applies to everything—food, art, industry. Much modern agricultural practice ignores the fundamental laws of health and balance in the pursuit of a purely quantitive production, made plausible by "scientific" discoveries. It would be fatal to the virtue and the vigour of the Irish people were they to adopt uncritically these mistaken but tempting short-cuts to a fallacious prosperity. The soil of Ireland, even her peat-bogs, is the precious matrix of the Irish soul. How much of that soil has been washing down the Liffey, the Shannon, and the other rivers into the seas all these centuries, is a matter for careful investigation. But afforestation is quite obviously a matter of great urgency. Given shelter from the Atlantic gales, luxuriant tree growth should be possible for Ireland, and many of the species from the Pacific coast of America might thrive in her climate. Careful planning should adjust the protection and enrichment of the hills with the agricultural holdings on the lower slopes, while the Religious Orders, with large estates, have a particular opportunity and duty in the planting of forest blocks.

Spiritual Regeneration Necessary

The temptations of the modern world, with its tendency to soulless abstraction intellectually and to mechanical automatism physically, are insidious and omnipresent. Perhaps they can only be constructively resisted by small communities and small countries. We face a new Dark Ages, with a Europe once more engulfed in barbarism, and overseas countries no longer sustained by optimistic and unlimited resources. Is it too much to expect that Ireland, fortunately "backward" and feckless in many ways, will be one of the chosen agents of our redemption? In the last Dark Ages it was the courage and inspiration of her saints and missionaries which lit the candles of Christendom in the wintry waste of a darkened Europe. Of recent years she has had Seers and visionaries to point her way in the modern age, forerunners, perhaps, of a time beyond our present chaos. Of these, at least one was practically as well as spiritually minded. A. E. in that manual of Irish polity, *The National Being*, wrote: "We may be certain that any intelligent rural community will try to feed itself first, and will only sell the surplus. It will realize that it will be unable to buy any food half as good as the food it produces." And to such expressions of neglected common sense we must add a lofty vision and penetrating perception of reality, showing that man is not alone with his energies and endeavours, but supported and irradiated by the light and strength that come from the Angelic Forces in the Universe. A. E. did not spurn the belief that Ireland *was* the Isle of Destiny, and that "the destiny will be glorious and not ignoble, and when our hour is come, we shall have something to give to the world, and we will be proud to give rather than to grasp." Such noble, indeed passionate, convictions, allied to practical wisdom, should inspire those who may now begin

that far-sighted programme of afforestation which, come what may, will preserve and fructify the soil of Ireland, and give her peoples that health and delight in beauty and skill which will enable them to be a redeeming example to a distracted and famine-threatened world.

SOME OBSERVATIONS ON THE CITRUS INDUSTRY

L. P. DeWolf

Crescent City, Florida, Citrus Grower

(*An address delivered at the* 1949 *annual convention of the United Farmers of America, at Peoria, Ill.*)

So much has been said and written about the relationship of our health and the food we eat to the soil from whence our food comes that I shall not try to elaborate on that subject, but instead I shall try to apply a few of the things that have already been said, to citrus fruit, both as to its interior quality or edibility and its outside appearance or eye appeal and the relationship of these two qualities to each other.

A perfectly normal orange when ripe is a beautiful golden yellow in color and very attractive. For convenience, oranges may be divided into two distinct varieties—sweet and sour. The sour orange is a good substitute for a lemon except that its rind is bitter like that of a grapefruit. The sweet orange may be divided into numerous different varieties but are generally classified as early, mid-season and late. The early varieties ripening in November and December, the mid-season in January and February, the late varieties in March and April.

Citrus fruit unlike some other fruit will not ripen after it has been picked, and it is impossible to ripen it by artificial methods. If picked immature and sour it will remain immature and sour until it rots regardless to whatever processing methods it may be subjected. It does not have to be picked green in order for it to be shipped to the markets. Unlike most other fruits it may be kept on the tree for weeks and even months after it has matured and then shipped to market in good condition.

It has been my privilege, while traveling in foreign countries, to pick ripe oranges from the trees growing in their wild state on mountain sides surrounded by other forest trees and shrubs. This fruit was of extra fine texture, completely free from discoloration or blemish and of the highest eating quality. It is very evident that nature has provided the citrus tree and its fruit with ample protection against all its enemies except the ignorance and greed of meddling man.

Citrus fruit is claimed by dietetics to be an essential part of our diet for the protection and promotion of good health, but it must be evident in arriving at these conclusions that the experts in nutrition were basing their findings on the normal fruit. Can it be possible, or does any one dare say, the fruit can have the essential minerals that go to make the best quality when the fruit is produced on trees grown on soils lacking in these most essential minerals? Can it be possible to grow the best oranges on roots

upon which nature intended another kind of fruit to grow? According to the U. S. Department of Agriculture it cannot be done.

The most common discoloration to which citrus fruit is subject is what is known as "rust." Rust is not a disease of the tree or the fruit, but is caused by a tiny mite, commonly called the "Rust Mite." It is of semi-microscopic proportions, being barely visible to the unaided eye. These mites get on the fruit in enormous quantities and by feeding on the rind cause it to have a rusty appearance thereby making it less attractive, but in no way imparing its eating quality. If the mites get on the fruit in large numbers during the early growing period they have a tendency to retard its growth and prolong the date of maturity, but give it a slightly sweeter and better flavor than a bright orange with all other conditions remaining equal. The reason for this can be readily understood when due consideration is given to the fact that a dark surface absorbs more of the sun's rays than a bright colored surface hence the packers and marketing agencies of our citrus fruit in discriminating against the rusty orange have violated the ancient commandment, "Thou shalt not bear false witness." The promoters of the sales of citrus fruit have followed along the lines of the least resistance and instead of attempting to teach the consumer how to select the highest quality fruit have appealed to his vanity and taught him to seek for the prettiest looking instead of the best eating fruit. All of our citrus fruits are subject to rust but there is no such thing as a "russet" variety.

Ever since I can remember some of our big growers and shippers have contended, though falsely, that citrus fruits get ripe before coloring, and a little over twenty-five years ago they managed to find a way to color it artificially. In certain localities the fruit naturally colors and ripens earlier than in some others. The growers less favorably located became envious of their more fortunate neighbors and proceeded to color their green fruit artificially and to beat the other fellow to the market.

The first method of artificial coloring is what is known as "degreening." No color is added by this process—only the chlorophyll is removed from the rind which leaves the fruit with a pale or sickly lemon yellow. Though the fruit has been subjected to this unnatural "decoloring" process the fruit is permitted by law to be shipped as natural color. The degreening is done in what is known as the coloring room which is constructed air tight. After filling the room with fruit it is closed securely and subjected to artificial heat and given a dose of poisonous gas. The gas most generally used is ethylene, but sometimes the gas from an ordinary kerosene stove is used, the gas being generated by partially smothering the flame. In spite of all this unnatural abuse they call the result of this process, "natural color"—another violation of the ancient commandment. In order to offset the undesirable appearance of this artificial "natural" color, a system of adding color has been devised. In order to comply with the requirements of the Pure Food and Drug Act, all fruit that has had color added to it must be stamped, "color added."

I have by actual measure extracted a little over four gallons of juice from a single bushel of Hamlin oranges, and the Hamlin is supposed to be the

lowest of all in juice content, and at this rate a standard (1 3-5 Bu.) box would have about six and one half gallons of juice. The Florida law, however, permits the shipping of fruit with only four gallons of juice to the standard box, and allows the adding of color to fruit with only four and one half gallons, and advertises it to be the best Florida has, when actually oranges with less than five gallons of juice content are very poor quality. The Florida law has set a slightly higher juice content standard for "color added" fruit than it has for fruit with natural color but, nevertheless, this standard which has been set is over thirty percent below the actual juice content of our best fruit. What about bearing false witness?

There are two facts that I would like to make clear at this point; first, it is impossible to add color to a green skinned orange, the green coloring matter of chlorophyll must be removed from the fruit before any color can be added to it; second, it is impossible to conceal or cover up rust by adding color for no matter how much color is added the rust will show through—the only way rust can be removed is to peel the fruit.

The "color added" process is patented and the patent holders collect a royalty on its use, so it is only natural to conclude that the reason for establishing a grading system based on outside appearance is to aid the patent holders in collecting their royalties and assist the insecticide men in selling their materials and spray machinery.

As few of our cultivated fruit trees will come true to seed the different varieties are maintained and perpetuated by budding or grafting on some accepted common root-stock. It has been my experience that the closer the relationship between the root and the top the better the quality of fruit produced. There are many different kinds of citrus rootstocks in use, including various hybrids, but the three in most general use are the sweet orange or sweet seedling, as it is usually called, the sour orange, and the rough lemon. I have both the sweet and the sour orange rootstocks, and a number of the old sweet seedling trees that have not been budded. It is my observation that a given variety of orange budded on a sweet root will be of slightly better quality than that budded on sour root and this is particularly true with certain varieties. It is an established and undeniable fact that trees budded on rough lemon root always produce a decidedly inferior quality of fruit than that grown on either the sweet or sour orange, and the difference is more pronounced in the early varieties than in the late, and the poorer the soil the poorer the quality of the fruit. This is explained by the fact that rough lemon will grow on soil too poor for either the sweet or the sour orange, and that it will grow faster and produce heavier crops of fruit with the same amount of care than the orange root. When you increase your output without increasing your source of supply there can be but one answer—poorer quality. If the lemon root were better adapted to growing oranges than the orange root I doubt if our all-wise Creator would have ever created an orange root.

It has been authentically estimated by those in high authority that between sixty and seventy-five percent of all the citrus in the state of Florida are grown on rough lemon root and the same authorities admit that fruit

grown on rough lemon root is of poorer quality than that grown on orange root. The nearer you can come to nature's way of producing fruit the better the quality of fruit you can produce. The shippers of Florida fruit should be forced by law to state whether their fruit is grown on orange or lemon root so that the consumer will have some chance of making a choice.

Even Hitler in his unprecedented war upon humanity refrained from the use of poisonous gas as a weapon, but here in America the law permits the packers and shippers of Florida oranges to steep this naturally delicious fruit in poisonous gas and then recommend it as a food for babies. Everyone should refuse to accept an orange that shows evidence of artificial color and refuse to buy Florida citrus fruit unless it can be obtained from some known reliable source until the Congress of the United States or the legislatures of the different states definitely put a stop to this damnable practice. The Florida citrus growers have tried to stop it but have failed—it is now up to the consumers.

What kind of eggs would you get from your grocery if the law required all eggs to be washed and then painted the same color and marked "color added," would you have any choice between the good and bad when they all looked exactly alike? And speaking of eggs reminds me of a certain well to do society lady who was giving a luncheon for her friends. All went well until she started serving the cake she had made for the occasion. Much to her dismay and chagrin, she soon discovered that it had a disagreeable odor and a peculiar flavor. Taking her new cook to one side she asked, "Did you put the two eggs in the cake like I told you?" The cook promptly replied, "Yes mum, but they were rotten so I put in two more to make up for 'em." The consumer should have the same privilege of choosing the kind of fruit he buys as he does the kind of eggs. He should have the right to buy the fruit just as it comes from the tree if he wishes to do so. As it now stands all Florida citrus fruit that is destined for the commercial trade channels must go through a licensed and bonded packing house and be washed and subjected to whatever processing the packer may elect and then graded according to its outside appearance—and for what purpose? To make sure that the processors and patent holders get their "rakeoff"—and for no other reason.

Write to your congressmen and senators in Washington and the members of your state legislature and protest against this citrus fruit fraud, and call their attention to the Golden Rule and the old commandment, "Thou shalt not bear false witness."

NOTES FROM THE ASSOCIATION OFFICE

EVELYN SPEIDEN

That Post Office!

Some weeks ago a subscriber from South America wrote us, "My Autumn number of *Bio-Dynamics* arrived together with a package containing copies of this publication addressed to the following:—and he gave names and correct addresses of eight other members and subscribers in Holland,

New Zealand, Sweden, South Africa and Scotland. "Knowing that these people are anxiously awaiting their copies of *Bio-Dynamics,* I am letting *you* know of the unfortunate situation so that you can remail their copies"—which was very kind of him. Faced with this letter, the post office said that they always tie up foreign envelopes together but that they should be resorted in New York City, that missent items of this kind should be handed back to the post office for sending on to the right address. We have reason to think that this may not be the first time this "unfortunate situation" has occurred, so in case your magazine has not always reached you, this may explain it . . . Now we are adopting the practice of sending out our foreign copies to only one country each day, which may help. So if you do not receive your issue quarterly, please let us know. A special effort is being made to get it out regularly in January, April, July and October. Although foreign copies will naturally arrive later than this, they still should arrive regularly.

A New Publication

The first issue of *Proteus Quarterly* appeared at Christmas time. This is not a farming or gardening magazine, but it will usually have at least one article along lines which would be of interest to our readers in view of its aim "to present all phases of creative human activity." The next issue will carry a paper on scientific methods: *Goethe In Our Own Time,* by Ehrenfried Pfeiffer. Copies may be procured from Proteus Press, Spring Valley, New York. Subscriptions are three dollars a year, single copies seventy-five cents.

Back Numbers

Frequent questions come to the Bio-Dynamic Association Office, R. D. 1, Chester, N. Y. about back numbers of *Bio-Dynamics.* This is the twentieth issue and so far we still have available all issues back as far as number six, the first five being exhausted. These contain much valuable material such as a series of articles on "How to Convert a Farm to Bio-Dynamics," another seasonal series on "The Art of Bee Keeping", a couple on "Weather", several on "Food," on Bio-Dynamics in other countries, on its economic side, on animal care and home slaughtering, stories of individual Bio-Dynamic projects, of Bio-Dynamic Conferences, book reviews, and last but not least records of the initiation, development and progress made in research in Dr. Pfeiffer's Biochemical Research Laboratory at the Threefold Farm, Spring Valley, N. Y. We have kept all issues of the magazine uniform in size so that they can be bound if desired. As time passes, more and more of the older issues will have disappeared. If you wish to complete your files of *Bio-Dynamics,* do not delay too long in getting missing numbers. When you write please state exactly which ones you want. The price is still the same (25 cents a copy), but we will appreciate it if you also send enough to cover postage.

Bio-Dynamic Food at Last!

During all the years the Bio-Dynamic idea has been gradually spreading, we have been plagued by two questions—very intelligent questions, yet

too often not answerable in the way we should like to have replied. One was: "Can you tell me of a Bio-Dynamic farm near me which I could visit?" Occasionally we could, but more often not, as our members are scattered so widely. The other was: "Where can we get Bio-Dynamically grown food?" Although many persons have grown such food for their own use, few have ever sold any. So it is now a great satisfaction to be able to tell our readers of two Bio-Dynamic food products now available.

Mr. H. S. Richmond is shipping Bio-Dynamic oranges from Maitland, Florida for the third season now. He does all the work in his small grove to save labor, ships the fruit unwashed and in bushel baskets only. With several kinds or oranges in the grove, he usually packs one variety in each basket. So one friend wrote us that they are "middling in size and appearance but wonderful, simply wonderful inside." Mr. Richmond's main difficulty is to keep his constantly returning customers happy, because his grove is too small to supply the demand.

This year for the first time, our neighbors here in Chester have an ample supply of Bio-Dynamic wheat to feed their fine mill, and are very busy shipping whole wheat flour and wheat cereal. This promises to develop into a real business. Various friends write in about it:

From Syracuse, N. Y.—"Several days ago we received the whole wheat cereal and flour. Its flavor and aroma are superb."

From Virginia—"The whole wheat from Mrs. Buschmann is much nicer than any other I have had."

From Long Island—"We have all enjoyed the bread made from your wheat so much that we feel lost when the flour runs out. All our family insist on having this bread sent them no matter how or where they are living. I could write pages on this subject of what it has done for all of us but you know all about that."

From North Carolina—"I hope you will send some recipes along. I have to tell everywhere how to make biscuits, as most people eat biscuits down here rather than make loaf bread. I do both and get splendid results. . . . Since receiving your letter I have been trying to interest friends in your delicious whole wheat flour to the point that I might order 100 lbs. to divide among us. So far I have orders for only 70 lbs. but I am confident there will be others."

From far off California—"The Bio-Dynamic cereal and flour arrived just before Christmas and I have been 'gobbling' it ever since, trying the recipes, talking about it, giving samples away and thoroughly appreciating it and the efforts behind it. . . . I am wondering how your supply is. I want much more, enough to keep me going until the next crop. Will you tell me how to keep it so as to retain the flavor?" (It keeps well in a dry and moderately cool place if the package is moved often. Every day or so, turn it upside down.)

Various other developments in the sale of Bio-Dynamic products are brewing and we hope as time goes on to be able to tell that more foods are available.

SOME VEGETABLE SEEDS

R. SCHONBECK

In response to a request in the Winter issue of "Bio-Dynamics" I am jotting down the names of some vegetable varieties with which I have had good luck in the past. My vegetable garden at present is located on Dr. Pfeiffer's farm at Chester, N. Y. The garden soil is of dark-brown to black color, very rich in organic matter (i.e. in humus form), but stony in part. The growing season begins near the first of April and lasts well into the first part of October. Summer dry spells are quite frequent and often severe. Here are my findings, to the best of my memory:

BUSH BEANS—Burpee's Tenderpod—unsurpassed in quality, yields indefinitely under good management.

BEETS—Detroit Dark Red, Burpee's Red Ball.

CABBAGE: Early—Copenhagen Market.
Late—Late Flat Dutch Red Cabbage.

CARROTS—Burpee's Goldinheart, Danvers Half Long, Chantenay.

CORN: Early—Carmelcross (good size ears, early and quite short in height).
Midseason—Joana.
Late—Snowcross

The above are Burpee hybrids. They stand up well in drought and have deep root systems. For the best in quality, we have our own 4th generation B.D. Golden Bantam Seed, which is open pollinated.

BROCCOLI—Calabrese or green sprouting—if well manured, will produce immense quantities till late October or November.

LETTUCE—Iceberg.

SQUASH—Fordhook Zucchini.

LATE SQUASH—Bush Tablequeen (an acorn squash).

PEAS—Thomas Loxton, Early Bird, Boston Telephone.

CHARD—Lucullus or Fordhook Giant.
Also Rhubarb Chard.

SPINACH—Bloomsdale Long Standing.

TOMATOES—Marglobe, Rutgers.

EGGPLANT—Black Beauty.

POTATOES—Try Katahdin! They have shallow eyes and superior taste and keeping qualities.

FOR RENT

Modern four-room cottage, electric kitchen, open fireplace, well-furnished, nicely landscaped. Ranch is located one mile beyond city limits, five miles from shopping district. Another ten miles take you to the Gulf of Mexico. You enjoy full privacy, for we have no other cottages for rent. From our dock you can explore the Manatee or Braden rivers by boat as well as fish, bathe or swim. Or you can "ride the ranch," which has a sandy beach and offers many places where you may wish to camp. Farm produce may be available depending upon season, etc. Strange as it may seem, this part of Florida is warm in Winter and cool in Summer, that is to say, we do not have the Northern heat waves.

Ideal place for a retired couple or a convalescing adult.

A. F. A. Konig

Duo River Ranch, Rt. 2, Manatee Station.

Bradenton, Florida.

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BIO-DYNAMIC*

WHOLE WHEAT FLOUR & WHOLE WHEAT CEREAL

Organically grown on farms using only the bio-dynamic treatment of soil, compost and manure.

Pure 100% natural product, stone ground with slow non-heating milling process.

No chemical processing of grain, no bleaching, no preservatives. Nothing removed. Nothing added.

Rich in major and trace minerals, highest values in phosphorus and magnesium. All vitamins retained.

Standard packages of 5 and 10 pounds of either flour or cereal, @ 20 cents per pound, plus postage.

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